Domain: Earth and Space Science
Earth Materials

ESS1 – The earth and earth materials as we know them today have developed over long periods of time, through continual change processes.
1. Students demonstrate an understanding of earth materials.

Grade Span (K-4)	Grade Span (5-8)	Grade Span (HS)
ESS1.1.1 Describe soils using their physical properties. ESS1.1.1a Distinguish soil from other objects or materials. (e.g., grass, wood, leaves, paper, rubber, food, etc.) ESS1.1.1b Describe soil using one physical property (e.g., color, size, shape, texture, smell, weight) (Suggestions: Feel soil; select soil when given soil and grass etc.)	**ESS1.1.1 Describe soils using their physical properties.** ESS1.1.1a Distinguish soil from other objects or materials. (e.g., grass, wood, leaves, paper, rubber, etc.) ESS1.1.1b Describe soil using <u>one or more</u> physical properties (e.g., color, size, shape, texture, smell, weight). (Suggestions: Feel soil; use microscope or hand lens to examine soil; select soil when given soil and grass etc.; describe or draw pictures of soil.)	**ESS1.1 <u>Identify</u> soils using their physical properties.)** ESS1.1.1a Distinguish soil from other objects or materials. (e.g., grass, wood, leaves, paper, rubber, etc.) ESS1.1.1b Describe soil using <u>two or more</u> physical properties (e.g., color, size, shape, texture, smell, weight). ESS1.1.1c Identify soils with specified physical properties. (Suggestions: Feel soil; use microscope or hand lens to examine and describe soil or draw pictures of what they see.)
ESS1.1.2 Describe rocks and minerals using their physical properties. ESS1.1.2a Distinguish rocks and minerals from other objects or materials. (e.g., grass, wood, leaves, paper, rubber, food, etc.) ESS1.1.2b Describe rocks and minerals using one physical property (e.g., color, size, shape, texture, smell, weight) (Suggestions: Examine minerals and rocks with	**ESS1.1.2 Describe rocks and minerals using their physical properties.** ESS1.1.2a Distinguish rocks and minerals from other objects or materials. (e.g., grass, wood, leaves, paper, rubber, food, etc.) ESS1.1.2b Describe rocks and minerals using one <u>or more</u> physical properties (e.g., color, size, shape, texture, smell, weight) (Suggestions: Feel rocks and minerals; weigh rocks and minerals; compare rocks and	**ESS1.1.2 <u>Identify</u> rocks and minerals using their physical properties.** ESS1.1.2a Distinguish rocks and minerals from other objects or materials. (e.g., grass, wood, leaves, paper, rubber, food, etc.) ESS1.1.2b Describe rocks and minerals using <u>two or more</u> physical properties (e.g., color, size, shape, texture, smell, weight). ESS1.1.2c <u>Identify rocks and minerals with specified physical properties (</u>e.g., color,

various properties; compare properties of different minerals or rocks; select the rock or mineral when given one along with one other object.)	minerals and (gems) in jewelry; do a hardness test; scratch for color; hammer on rocks and minerals to determine hardness.)	size, shape, texture, smell, weight). (Suggestions: Feel rocks; use microscope to examine and describe or draw pictures; weigh rocks and minerals; compare rocks and minerals (gems) in jewelry; do a hardness test, scratch for color; hammer on rocks and minerals to determine hardness.)
ESS1.1.3 Compare different soils to each other. ESS1.1.3a Match soils using one physical property. ESS1.1.3b Sort soils using one physical property. ESS1.1.3c Compare soils using one physical property. (Suggestions: Provide bowls with organic soil, clay-rich soil, and sandy soil and have students compare the different soils.)	**ESS1.1.3 Compare different soils to each other.** ESS1.1.3a Match soils using one or more physical properties. ESS1.1.3b Sort soils using one or more physical properties. ESS1.1.3c Compare soils using one or more physical properties. ESS1.1.3d Classify soils using one or more physical properties. (Suggestions: Provide bowls with organic soil, clay-rich soil, and sandy soil and have students compare the different soils.)	**ESS1.1.3 Compare different soils to each other.** ESS1.1.3a Match soils using two or more physical properties. ESS1.1.3b Sort soils using two or more physical properties. ESS1.1.3c Compare soils using two or more physical properties. ESS1.1.3d Classify soils using two or more physical properties. (Suggestions: Provide bowls with organic soil, clay-rich soil, and sandy soil and have students compare the different soils.)
ESS1.1.4 Compare different rocks and minerals to each other. ESS1.1.4a Match rocks and minerals using one physical property. ESS1.1.4b Sort rocks and minerals using one physical property. ESS1.1.4c Compare rocks and minerals using	**ESS1.1.4 Compare different rocks and minerals to each other.** ESS1.1.4a Match rocks and minerals using one or more physical properties. ESS1.1.4b Sort rocks and minerals using one or more physical properties. ESS1.1.4c Compare rocks and minerals using	**ESS1.1.4 Compare different rocks and minerals to each other.** ESS1.1.4a Match rocks and minerals using two or more physical properties. ESS1.1.4b Sort rocks and minerals using two or more physical properties. ESS1.1.4c Compare rocks and minerals using

one physical property. (Suggestions: Examine a variety of rocks and minerals, sort them into categories and compare rocks to each other, compare minerals to each other, and compare rocks to minerals.) **ESS1.1.5 Compare rocks and minerals to soils.** ESS1.1.5a Sort and separate soils from rocks and minerals. ESS1.1.5b Compare soils to rocks and minerals using one physical property. (e.g., color, size, shape, texture, smell, weight). (Suggestions: Examine a rock or mineral and soil and describe the differences.)	<u>one or more</u> physical properties. (Suggestions: Examine a variety of rocks and minerals, sort them into categories and compare rocks to each other, compare minerals to each other, and compare rocks to minerals.) **ESS1.1.5 Compare rocks and minerals to soils.** ESS1.1.5a Sort and separate soils from rocks and minerals. ESS1.1.5b Compare soils to rocks and minerals using <u>one or more</u> physical properties (e.g., color, size, shape, texture, smell, weight). <u>ESS1.1.5c Make predictions about physical properties of soils, rocks and minerals.</u> <u>ESS1.1.5d Collect data about the properties of soils, rocks and minerals.</u> (Suggestions: Examine a rock or mineral and soil and describe the differences. Predict which rock is heavier, given a variety of rocks. Visit quarry/landscape store; gather soil from various areas around the school; using various soils plant seeds; create a mosaic/step stones; gather rocks in the area; use a rock tumbler; compare how much water a particular soil will hold (predict); estimate how many rocks will fill a particular container; create a chart that reflects the class's collected rocks.)	<u>two or more</u> physical properties. (Suggestions: Examine a variety of rocks and minerals, sort them into categories and compare rocks to each other, compare minerals to each other, and compare rocks to minerals.) **ESS1.1.5 Compare rocks and minerals to soils.** ESS1.1.5a Sort and separate soils from rocks and minerals. ESS1.1.5b Compare soils to rocks and minerals using <u>two or more</u> physical properties (e.g., color, size, shape, texture, smell, weight). ESS1.1.5c Make predictions/<u>hypotheses</u> about physical properties of soils, rocks and minerals. ESS1.1.5d Collect data about the properties of soils, rocks and minerals. <u>ESS1.1.5e Use data to accept or reject prediction/hypotheses about physical properties of soils, rocks and minerals.</u> <u>ESS1.1.5f Indicate why some earth materials are classified together and some are not.</u> ESS1.1.5g <u>Complete charts showing hardness, color, streak, density, etc. of given rocks and minerals,</u> (Suggestions: Examine a rock or mineral and soil and describe the differences. Predict

		which rock is heavier, given a variety of rocks. Visit quarry/landscape store; gather soil from various areas around the school; using various soils plant seeds; create a mosaic/step stones; gather rocks in the area; use a rock tumbler; compare how much water a particular soil will hold (predict); estimate how many rocks will fill a particular container; create a chart that reflects the class's collected rocks;create a Venn diagram to classify rocks, soils, and minerals according to their properties; Choose the one that doesn't belong by feeling rocks, weighing rocks and minerals, comparing rocks and minerals (gems) in jewelry; doing a hardness test, scratch for color, hammer on rocks and minerals to show hardness)

Earth Materials (continued)

ESS1 – The earth and earth materials as we know them today have developed over long periods of time, through continual change processes.
1. Students demonstrate an understanding of earth materials.

Grade Span (K-4)	Grade Span (5-8)	Grade Span (HS)
	ESS1.1.6 Identify the four basic materials of the earth (water, soil, rocks and air.) ESS1.1.6a Identify water as a basic earth material. ESS1.1.6b Identify soil as a basic earth material. ESS1.1.6c Identify rocks as a basic earth material. ESS1.1.6d Identify air as a basic earth material. (Suggestions: Identify a basic earth material when given two different basic earth materials; compare the basic earth materials.) **ESS1.1.7 Identify the uses of the four basic earth materials (water, soil, rocks and air).** ESS1.1.7a Identify one or more uses of	**ESS1.1.6 Identify the four basic materials of the earth (water, soil, rocks and air.)** ESS1.1.6a Identify water as a basic earth material. ESS1.1.6b Identify soil as a basic earth material. ESS1.1.6c Identify rocks as a basic earth material. ESS1.1.6d Identify air as a basic earth material. (Suggestions: Identify a basic earth material when given different basic earth materials; compare the basic earth materials.) **ESS1.1.7 Identify the uses of the four basic earth materials (water, soil, rocks and air).** ESS1.1.7a Identify two or more uses of water.

	water. ESS1.1.7b Identify one or more uses of soil. ESS1.1.7c Identify one or more uses of rocks. ESS1.1.7d Identify one or more uses of air. (Suggestions: Drink (taste) water; use water, involve students in a scavenger hunt to find water, soil, rocks, and air; make a collage using magazine pictures of the four basic earth materials; grow plants in soil; touch & use rocks – build a model wall/house, build a model dam; raise a guppy in a jar with a plant to demonstrate that the guppy needs water and air and the plant recycles the carbon dioxide and provides oxygen for the guppy; observe videos and photographs, read books, build a home for a pet (fish, hermit crab); build a biosphere; work with balloons to understand air.)	ESS1.1.7b Identify two or more uses of soil. ESS1.1.7c Identify two or more uses of rocks. ESS1.1.7d Identify two or more uses of air. ESS1.1.7e Determine the best earth materials for specific purposes. (Suggestions: Drink (taste) water; use water; involve students in a scavenger hunt to find water, soil, rocks, and air; make a collage using magazine pictures of the four basic earth materials; grow plants in soil; touch & use rocks – build a model wall/house, build a model dam; raise a guppy in a jar with a plant to demonstrate that the guppy needs water and air and the plant recycles the carbon dioxide and provides oxygen for the guppy; observe videos and photographs, read books, build a home for a pet (fish, hermit crab); build a biosphere; work with balloons to understand air.)

Water Cycle

ESS1 – The earth and earth materials as we know them today have developed over long periods of time, through continual change processes. **2. Students demonstrate an understanding of processes and change over time within earth systems.**		
Grade Span (K-4)	Grade Span (5-8)	Grade Span (HS)

ESS1.2.1 Identify the forms of water in the water cycle. ESS1.2.1a Identify water in the liquid form. ESS1.2.1b Identify water in the solid form. ESS1.2.1c Identify water in the gas form. (Suggestions: compare liquid water to ice, boil water and watch the steam, use cool-mist humidifier to feel steam.)	**ESS1.2.1 Identify the components and changes represented by the water cycle.** ESS1.2.1a Identify water in the liquid form. ESS1.2.1b Identify water in the solid form. ESS1.2.1c Identify water in the gas form. ESS1.2.1d Identify the three forms of water in the water cycle. ESS1.2.1e Identify the water cycle and its parts, including evaporation, precipitation, run-off, condensation, groundwater, and transpiration. ESS1.2.1f Identify the changes between the parts of the water cycle (with arrows). (Suggestions: Heat water on a hot plate to produce steam, then place a cold surface above the hot plate so the steam will condense into liquid water again; measure evaporation from a glass of water left on a windowsill or table; read or watch age appropriate materials; work with ice in a glass of water; make a diagram showing the relationships between ice, liquid water, and steam.)	**ESS1.2.1 Identify the components and changes represented by the water cycle.** ESS1.2.1a Identify water in the liquid form. ESS1.2.1b Identify water in the solid form. ESS1.2.1c Identify water in the gas form. ESS1.2.1d Identify the three forms of water in the water cycle. ESS1.2.1e Identify the water cycle and its parts, including evaporation, precipitation, run-off, condensation, groundwater, and transpiration. ESS1.2.1f Identify the changes between the parts of the water cycle (with arrows). ESS1.2.1g Use arrows to show the relationship between the parts of the water cycle. (Suggestions: Identify the water cycle and its parts; observe steam in bathroom and compare to rain, observe condensation on a mirror and compare to rain; label a transparency showing the water cycle and show with an overhead projector; fill a graduated jar with water and let the water evaporate and student observe change, observe leaves through the microscope to see openings where transpiration occurs.) **ESS1.2.2 Identify that water moves rocks and soils.** ESS1.2.2a Recognize the different ways

		water moves rocks and soils. (e.g., floods, tides. raindrops, rivers, etc.) ESS1.2.2b Recognize erosion. ESS1.2.2c Communicate an understanding of erosion. (Suggestions: Use a stream table to do different investigations with rocks and soils and water intensities observe erosion in the schoolyard if possible, observe pictures of floods, tides etc., use an Environmental Control Unit (ECU) & a switch for different investigations; use water to make rocks move.)

Earth's Surface and Layers

ESS1 – The earth and earth materials as we know them today have developed over long periods of time, through continual change processes. **2. Students demonstrate an understanding of processes and change over time within earth systems.**		
Grade Span (K-4)	Grade Span (5-8)	Grade Span (HS)
ESS1.2.3 Identify the earth's surface. ESS1.2.3a Recognize the positional relationship between the student, the student's actual surroundings and the earth's surface. e.g., Where are you in the room? ESS1.2.3b Identify the ground as the earth's surface. (Suggestions: Provide classroom map for observation and analysis; Maintain an ant farm to examine the relationship between the surface and the underground tunnels (compare the ant farm surface to the Earth's surface); locate home on globe.)	**ESS1.2.3 Identify the earth's surface <u>and that it changes with time.</u>** ESS1.2.3a Recognize the positional relationship between the student, the student's actual surroundings and the earth's surface. e.g., <u>Where are you in the school?</u> ESS1.2.3b Identify the ground as the earth's surface. <u>ESS1.2.3c Recognize that the earth's surface changes with time.</u> (Suggestions: Provide school map for observation and analysis; Maintain an ant farm to examine the relationship between the surface and the underground tunnels (compare the ant farm surface to the Earth's surface); locate home on globe.)	**ESS1.2.3 Identify the earth's surface and that it changes with time.** ESS1.2.3a Recognize the positional relationship between the student, the student's actual surroundings and the earth's surface. e.g., <u>Where are you in the community?</u> <u>On the Earth?</u> ESS1.2.3b Identify the ground as the earth's surface. ESS1.2.3c Recognize that the earth's surface changes with time. <u>ESS1.2.3d Explore models of the earth showing the crust, mantle and core. (The idea that there are different layers in the earth is important, not the ability to identify the names of the layers.)</u> (Suggestions: Provide town map for observation and analysis; Maintain an ant farm to examine the relationship between the surface and the underground tunnels (compare the ant farm surface to the Earth's surface); locate home on globe; Observe news photos/satellite pictures of areas before and after major storms; Make models of the layers of the earth, make a model of layers of the earth with colored

		clay; look at layers in "Earth Model" using Rice Krispie Treats.)

Change

ESS1 – The earth and earth materials as we know them today have developed over long periods of time, through continual change processes. **2. Students demonstrate an understanding of processes and change over time within earth systems.**		
Grade Span (K-4)	Grade Span (5-8)	Grade Span (HS)
ESS1.2.4 Recognize that some changes happen faster than others. ESS1.2.4a Identify relatively slow changes. e.g., Feel an object slowly warm up in the sun. ESS1.2.4b Identify relatively fast changes. (Suggestion: Feel water from a faucet speeding up as the handle is turned.)	**ESS1.2.4 Recognize that some changes happen faster than others.** ESS1.2.4a Identify relatively slow changes. e.g., a rock slowly weathers into soil ESS1.2.4b Identify relatively fast changes. e.g., a volcano erupts, an earthquake occurs, a hurricane or storm occurs ESS1.2.4c Identify how some objects warm and cool more slowly than other objects. 2.4d Identify the difference between fast and slow changes. (Suggestions: Feel water from a faucet speeding up as the handle is turned; Put a stalk of celery in colored water and observe the celery changing color; personal timeline, watch food color diffuse in water; ripping paper; light a match, feel two different objects, one dark in color and one light in color, as they warm up in the sun.)	**ESS1.2.4 Recognize that some changes happen faster than others.** ESS1.2.4a Identify relatively slow changes. e.g., a rock slowly weathers into soil ESS1.2.4b Identify relatively fast changes. e.g., a volcano erupts, an earthquake occurs, a hurricane or storm occurs ESS1.2.4c Identify how some objects warm and cool more slowly than other objects. ESS1.2.4d Identify the difference between fast and slow changes. (Suggestions: Feel water from a faucet speeding up as the handle is turned; Put a stalk of celery in colored water and observe the celery changing color; personal timeline, watch food color diffuse in water; ripping paper; light a match, feel two different objects, one dark in color and one light in color, as they warm up in the sun.)

ESS1.2.5 Identify air and water of different temperatures. ESS1.2.5a Identify that air can have different temperatures. ESS1.2.5b Identify that water can have different temperatures. (Suggestions: Feel cool water and warm water, Feel that the air above an ice cube is cooler than the air above a warm object; relate warm temperatures to sun, observe and feel changes as an ice cube is placed in water)	**ESS1.2.5 Identify <u>how</u> air and water can have different temperatures.** ESS1.2.5a <u>Identify the cause of changes in air temperatures.</u> ESS1.2.5b <u>Identify the cause of changes in water temperatures.</u> (Suggestions: Feel cool water and warm water, Feel that the air above an ice cube is cooler than the air above a warm object; relate warm temperatures to sun, observe and feel changes as an ice cube is placed in water) **<u>ESS1.2.6 Describe how wind and water change Earth.</u>** <u>ESS1.2.6a Describe how erosion by wind, water (including floods), and glaciers change the earth.</u> <u>ESS1.2.6b Describe deposition of sediment.</u> <u>ESS1.2.6c Identify landforms.</u> (Suggestions: Use visits, pictures, videos, or audio descriptions to show landforms to students.)	**ESS1.2.5 Identify how air and water can have different temperatures.** ESS1.2.5a Identify the cause of changes in air temperatures. ESS1.2.5b Identify the cause of changes in water temperatures. <u>ESS1.2.5c Predict temperature in various environments.</u> <u>ESS1.2.5d Compare air temperatures to water temperatures in the same environment.</u> (Suggestions: Feel cool water and warm water, Feel that the air above an ice cube is cooler than the air above a warm object; relate warm temperatures to sun, observe and feel changes as an ice cube is placed in water) **ESS1.2.6 <u>Describe how wind and water shape land.</u>** ESS1.2.6a Describe how erosion by wind, water (including floods), and glaciers shapes land. ESS1.2.6b <u>Simulate</u> deposition of sediment. ESS1.2.6c Identify landforms. (Suggestions: Use visits, pictures, videos, or audio descriptions to show landforms to students.)

	ESS1.2.7 Identify that rocks change into other rocks. ESS1.2.7a Match rocks by type (igneous, sedimentary, and metamorphic). ESS1.2.7b Sort rocks into groups by type. ESS1.2.7c Compare igneous, sedimentary and metamorphic rocks. (Suggestions: Match temperatures to different environments using pictures, match relative temperatures by observing clothing of people in different pictures; use 3 stream tables and set up ahead of time, w/sand and small rocks. While students are gone, move rock & sand w/wind (blow-dryer), glacier (ice) & water have students figure out what caused what caused the changes; have students create containers w/sand pebbles, water, silt soil & shale to watch the layering – similar to sand art, break a rock into smaller pieces using a hammer; create a sand stone.)	**ESS1.2.7 Identify that rocks change into other rocks.** ESS1.2.7a Match rocks by type (igneous, sedimentary, and metamorphic). ESS1.2.7b Sort rocks into groups by type. ESS1.2.7c Compare igneous, sedimentary and metamorphic rocks. ESS1.2.7d Identify rocks as igneous, sedimentary or metamorphic. ESS1.2.7e Identify that rocks change into other rocks. (Suggestions: Match temperatures to different environments using pictures, match relative temperatures by observing clothing of people in different pictures; use 3 stream tables and set up ahead of time, w/sand and small rocks. While students are gone, move rock & sand w/wind (blow-dryer), glacier (ice) & water have students figure out what caused what caused the changes; have students create containers w/sand pebbles, water, silt soil & shale to watch the layering – similar to sand art, break a rock into smaller pieces using a hammer; create a sand stone.) **ESS1.2.8 Describe how rocks form.** ESS1.2.8a Describe one way that rocks form from other rocks through erosion and deposition.

		ESS1.2.8b Describe one way that rocks form from melted rock material. (See 2.2) ESS1.2.8c Describe one way that rocks form from alteration by heat and pressure. (Suggestions: Observe rocks from volcanoes; smash concrete w/ hammer to demonstrate production of sediments; Elmer's glue & sand to show compactness of sandstone) **ESS1.2.9 Represent processes of the rock cycle in words, models or diagrams.** ESS1.2.9a Identify the parts of the rock cycle. ESS1.2.9b Identify the changes represented in the rock cycle. ESS1.2.9c Create a representation of the rock cycle. (Suggestions: Draw pictures of the rock cycle or label a diagram of the rock cycle.)

Earth Features

ESS1 – The earth and earth materials as we know them today have developed over long periods of time, through continual change processes.
1. Students demonstrate an understanding of processes and change over time within earth systems.

(K-4)	(5-8)	(HS)
	ESS1.2.10 Investigate volcanoes, faults and earthquakes and how they are related. ESS1.2.10a Identify physical properties of volcanoes. ESS1.2.10b Identify physical properties of faults. ESS1.2.10c Recognize what happens when a fault moves (earthquakes). (Suggestions: Observe/feel/hear videos, pictures, models, simulate earth questions, model of a volcano; graham cracker & frosting activity to show faults & movement; create a 'town' between 2 desks & move desks to simulate earthquake; fossils – plaster of paris; leaf press.) **ESS1.2.11 Identify geologic processes of**	**ESS1.2.10 Investigate volcanoes, faults and earthquakes and how they are related.** ESS1.2.10a Identify physical properties of volcanoes. ESS1.2.10b Identify physical properties of faults. ESS1.2.10c Recognize what happens when a fault moves (earthquakes). ESS1.2.10d Recognize the relationships between and among volcanoes, earthquakes and faults. (Suggestions: Observe/feel/hear videos, pictures, models, simulate earth questions, model of a volcano; graham cracker & frosting activity to show faults & movement; create a 'town' between 2 desks & move desks to simulate earthquake; fossils – plaster of paris; leaf press; on a map place pictures of volcanoes & earthquakes to find the connection; build a tower out of blocks & knocking it down to simulate the effects of an earthquake.) **ESS1.2.11 Identify geologic processes**

	fossil formation. ESS1.2.11a Identify how fossils form. ESS1.2.11b Distinguish between fossils and other objects. (Suggestion: Make a fossil with plaster and/or crayon rubbing.)	**of fossil formation**. ESS1.2.11a Identify how fossils form. ESS1.2.11b Distinguish between fossils and other objects. (Suggestion: Make a fossil with plaster and/or crayon rubbing. **ESS1.2.12 Identify the patterns of landforms and geologic processes.** ESS1.2.12a Identify fossil patterns.(e.g., similar fossils from different parts of the world) ESS1.2.12b Identify patterns of earthquake, fault, and volcano location. (e.g. ring of fire, mid-Atlantic Ridge) (Suggestions: Compare similar fossils that were found at different locations; plot volcano and earthquake locations on a map of the world.)

Weather

ESS1 – The earth and earth materials as we know them today have developed over long periods of time, through continual change processes.
1. Students demonstrate an understanding of processes and change over time within earth systems.

Grade Span (K-4)	Grade Span (5-8)	Grade Span (HS)
ESS1.2.13 Recognize weather and seasonal changes throughout the year. ESS1.2.13a Describe daily weather. (e.g., clouds, hot, cold, wet, dry) ESS1.2.13b Identify each season. ESS1.2.13c Describe each season. (Suggestion: Keep a record of seasonal changes; identify the season when given a picture showing something seasonally obvious – like snow for winter, baby birds for spring; keep a daily record of air temperature, cloud observations, and precipitation.)	**ESS1.2.13 Recognize weather and seasonal changes throughout the year.** ESS1.2.13a Describe daily weather. (e.g., clouds, cloud types, hot, cold, wet, dry, humidity, precipitation) ESS1.2.13b Identify each season. ESS1.2.13c Describe each season. ESS1.2.13d Identify weather data collection tools (e.g. thermometer, weather/wind vane, rain gauge, wind sock, barometer). 1.2.13e Collect data using one or more weather data collecting tools. (Suggestions: Keep a daily record of air temperature, cloud observations, and precipitation, relative humidity by using a weather station; check the weather report in the newspaper each day; create weather instruments.) **ESS1.2.14 Associate air pressure with the weight of air on the earth.** ESS1.2.14a Identify that the weight of air	**ESS1.2.13 Recognize weather and seasonal changes throughout the year.** ESS1.2.13a Describe daily weather (e.g., clouds, cloud types, hot, cold, wet, dry, humidity, precipitation) ESS1.2.13b Identify each season. ESS1.2.13c Describe each season. ESS1.2.13d Identify weather data collection tools (e.g. thermometer, weather/wind vane, rain gauge, wind sock, barometer). ESS1.2.13e Collect data using two or more weather data collecting tools. ESS1.2.13f Predict weather based on gathered data. (Suggestions: Keep a daily record of air temperature, cloud observations, precipitation, and relative humidity by using a weather station; check the weather report in the newspaper each day; create weather instruments.) **ESS1.2.14 Associate air pressure with the weight of air on the earth.** ESS1.2.14a Identify that the weight of air

	varies on different parts of the earth's surface. (Suggestions: Pictures of pilots wearing air masks to illustrate air pressure; Mt. Everest climbers; empty container with another container that fits snugly inside – feel the pressure; measure the circumference of a balloon, then place the balloon in hot water then measure the circumference, then place the balloon in ice water and measure the circumference, then compare the sizes.)	varies on different parts of the earth's surface. ESS1.2.14b Compare differences in air pressure (the weight of air on the earth's surface) with differences in weather. (Suggestions: Pictures of pilot in plane w/air mask; scuba diver w/oxygen make; person walking down a street; measure the circumference of a balloon, then place the balloon in hot water then measure the circumference, then place the balloon in ice water and measure the circumference, then compare the sizes; put air in a balloon and place in refrigerator and observe change in volume.) **ESS1.2.15 Recognize that the atmosphere is made up of different layers.** ESS1.2.15a Identify layers of the atmosphere. ESS1.2.15b Describe the layers of the atmosphere. (Suggestion: Make and label diagrams of the atmospheric layers.)

Solar System

ESS2 – The earth is part of a solar system, made up of distinct parts that have temporal and spatial interrelationships.
3. Students demonstrate an understanding of our solar system.

Grade Span (K-4)	Grade Span (5-8)	Grade Span (HS)
ESS1.3.1 Identify the major effects the sun has on the earth. ESS1.3.1a Collect data to show that the sun warms the earth during daytime. ESS1.3.1b Collect data to show the difference in temperature between a shady spot and a sunny spot. ESS1.3.1c Describe the differences between night and day. ESS1.3.1d Identify the sun's position as it changes throughout the day. (e.g., sunrise, noon, sunset) (Suggestions: Take the temperature at the same location outside at different times during the day and compare the temperatures, take the temperature in a sunny spot and a shady spot and compare, Keep track of the sun's position at different times during the day.)	**ESS1.3.1 Identify the major effects the sun has on the earth.** ESS1.3.1a Collect data to show that the sun warms the earth during daytime. ESS1.3.1b Collect data to show the difference in temperature between a shady spot and a sunny spot. ESS1.3.1c <u>Relate the night/day differences in temperature to the sun's position in the sky.</u> ESS1.3.1d Identify the sun's position as it changes throughout the day. (e.g., sunrise, noon, sunset, <u>dawn, dusk</u>) (Suggestions: Record temperature every hour in their weather station; record where the sun is in the sky at different times during the day; compare the temperature when the sun is behind clouds to the temperature when the sun is shining.)	**ESS1.3.1 Identify the major effects the sun has on the earth.** ESS1.3.1a Collect data to show that the sun warms the earth during daytime. ESS1.3.1b Collect data to show the difference in temperature between a shady spot and a sunny spot. ESS1.3.1c Relate the night/day differences in temperature to the sun's position in the sky. ESS1.3.1d Identify the sun's position as it changes throughout the day. (e.g., sunrise, noon, sunset, dawn, dusk) <u>ESS1.3.1e Identify the sun as a star.</u> <u>ESS1.3.1f Compare the sun to other stars.</u> (Suggestions: Record temperature every hour in their weather station; record where the sun is in the sky at different times during the day; compare the temperature when the sun is behind clouds to the temperature when the sun is shining.)
ESS1.3.2 Identify the moon. ESS1.3.2a Distinguish the moon from other objects in the sky. e.g., stars, planets	**ESS1.3.2 Identify the moon.** ESS1.3.2a Distinguish the moon from other objects in the sky.	**ESS1.3.2 Identify the moon.** ESS1.3.2a Distinguish the moon from other objects in the sky. Suggestion: This can be

ESS1.3.2b Identify changes in the moon's appearance. (Suggestions: Use tactile models; Identify the moon, stars and planets on pictures of the night sky; make models of the moon, planets and sun; record the appearance of the moon each evening.)	ESS1.3.2b Identify <u>and record</u> changes in the moon's appearance. (Suggestions: Use tactile models; Create an accurate picture of the moon & other nighttime objects in the sky; draw phases of the moon; chart on a class calendar the upcoming phases of the moon; chart on an individual calendar the daily/nightly appearances of the moon; draw or cut phases of the moon from a newspaper.) **<u>ESS1.3.3 Recognize that earth is a planet.</u>** <u>ESS1.3.3a Identify that the surface we live on is the surface of the planet earth.</u> <u>ESS1.3.3b Recognize that there are other planets in the solar system.</u> e.g., work with globes, and models of the planets in the solar system, research the planets	done through tactile models. ESS1.3.2b Identify and record changes in the moon's appearance. <u>ESS1.3.2c Compare the daily times the moon becomes visible throughout the year.</u> (Suggestions: Create an accurate picture of the moon & other nighttime objects in the sky; chart on a class calendar the upcoming phases of the moon; chart on an individual calendar the daily/nightly appearances of the moon; Keep a record of the appearance of the moon and other objects in the sky; draw phases of the moon; cut out pictures of the moon phases from newspapers.) **<u>ESS1.3.3 Recognize that earth is a planet.</u>** ESS1.3.3a Identify that the surface we live on is the surface of the planet earth. <u>ESS1.3.3b Identify at least one characteristic of two or more planets other than Earth.</u> <u>e.g., size, distance from sun, number of moons, color, presence of rings, relative temperature</u>

Solar System (continued)

ESS1 – The earth and earth materials as we know them today have developed over long periods of time, through continual change processes.
3. Students demonstrate an understanding of processes and change over time within earth systems.

Grade Span (K-4)	Grade Span (5-8)	Grade Span (HS)
	ESS1.3.4 Identify parts of the earth-moon-sun system. ESS1.3.4a Identify the parts of an earth-moon-sun model. (Suggestion: Create a model with labels of the earth-moon-sun system; Act out the motions within the earth-moon-sun system; create models with movable parts; make a mobile.)	**ESS1.3.4 Identify the parts of the earth-moon-sun system and how they move.** ESS1.3.4a Identify the parts of an earth-moon-sun model. ESS1.3.4b Demonstrate the movements within the earth-moon-sun system. (Suggestions: Create a model with labels of the earth-moon-sun system; Act out the motions within the earth-moon-sun system; create models with movable parts; make a mobile.) **ESS1.3.5 Discuss stories about understandings of the solar system by different cultures and by scientists at different times in history.** (Suggestion: Read stories from many cultures about the solar system.) **ESS1.3.6 Recognize the impact of gravity on objects in the solar system.** ESS1.3.6a Define gravity. ESS1.3.6b Recognize examples of the

		actions of gravity. (Suggestion: Drop different objects, observe what happens, and record results of these investigations.)

Universe

ESS3 – The origin and evolution of galaxies and the universe demonstrate fundamental principles of physical science across vast distances and time. **4. Students demonstrate an understanding of the origin and evolution of stars.**		
Grade Span (K-4)	Grade Span (5-8)	Grade Span (HS)
	ESS1.4.1 Identify stars. ESS1.4.1a Distinguish stars from other objects in the sky. (e.g., moon, planets). ESS1.4.1b Recognize one or more constellations. (Suggestions: Create tin can or construction paper constellations; expose students to various cultural stories/legends that explain where the constellations came from; create a night-time sky model that includes stars.)	**ESS1.4.1 Identify stars.** ESS1.4.1a Distinguish stars from other objects in the sky. (e.g., moon, planets). ESS1.4.1b Recognize two or more constellations. ESS1.4.1c Compare two or more constellations. ESS1.4.1d Identify that star brightness changes over time. ESS1.4.1e Identify that star size changes over time. (Suggestions: Create tin can or construction paper constellations; expose students to various cultural stories/legends that explain where the constellations came from; create a night-time sky that includes stars.)

Science Glossary terms:

Condensation: the process by which water vapor becomes liquid water

Deposition: when transported earth materials are dropped in another location

Erosion: movement of weathered rock and soil

Evaporation: the process by which liquid water becomes a gas (vapor)

Faults: fracture or system of fractures that form in the earth's crust when there is great stress

Fossil: traces or remains of organisms that lived in the past

Fossil formation: fossils can form when the original is preserved (in ice or peat bogs), when hard parts are altered, when molds and casts form where the organism has decayed in sediments, when organisms leave traces such as footprints and waste materials

Gravity: a force that acts to pull objects together

Ground water: water under the land surface that is stored in rock pores

Hypothesis: a tentative explanation used as a basis for further investigation

Igneous rock: a rock that forms when melted rock (lava or magma) cools and crystallizes

Metamorphic rock: a rock that forms when other rocks are changed by intense heat and pressure

Physical property: attribute of an object or a substance that can be observed and/or measured without changing the object or substance into something else

Precipitation: any form of water that falls to earth from a cloud

Run off: water that flows over the land surface outside of a channel

Sediment: pieces of rocks

Sedimentary rock: a rock that forms through lithification (cementation) of sediments or through chemical processes such as evaporation

Stream table: a large rectangular container that is used to model the effects of water on sediments (sediment is placed in the bottom, and water flows over the sediment to model erosion – can be obtained from scientific supply houses or borrowed from earth science teachers)

Transpiration: loss of water vapor from plants, usually through the stomata on the leaves. This process causes water to move through the plant by way of the roots, stems, and leaves.

Water cycle: a model describing the movement of water in, on, and above the earth